

Amendments to the Claims:

1-2. (Cancelled)

3. (Currently Amended) ~~[[The]]~~ A method according to claim 1,
wherein for monitoring a patient comprising:

receiving a plurality of monitored signals carried on leads from the
patient, each of the monitored signals providing information as to health of the
patient;

employing hypothesis testing against each of the plurality of monitored
signals to determine whether an artifact is present in the plurality of monitored
signals, in which a null hypothesis includes an assumption that pairs of samples of
correlated monitored signals of the plurality of monitored signals have a
predetermined distribution, and the predetermined distribution includes including the
same distribution as corresponding pairs of stored versions of the plurality of
monitored signals;

determining that an artifact may exist in one of the plurality of
monitored signals when a likelihood that the null hypothesis is true falls below a
predetermined confidence level; and

in response to the likelihood falling below the predetermined
confidence level, generating an alert on a user interface device.

4. (Currently Amended) The method according to ~~claim 1~~
claim 3, wherein the hypothesis testing includes generating a probability that each of
the monitored signals includes an artifact.

5. (Currently Amended) The method according to claim 4,
~~further comprising wherein~~ generating the alert includes:

generating an output signal to artifact alert an operator that at least one
of the monitored signals includes an artifact on the user interface when the generated
probability exceeds a predetermined threshold.

6. (Cancelled)

7. (Currently Amended) The method according to ~~claim 6~~ claim 9, further comprising:

calculating a correlation matrix for the plurality of monitored signals ($S_1 \dots S_n$) from a database of a plurality of stored monitored signals as follows:

$$\begin{bmatrix} r_{11} & \cdots & r_{1n} \\ \vdots & & \vdots \\ r_{n1} & \cdots & r_{nn} \end{bmatrix}$$

wherein r_{11} is an autocorrelation of a first monitored signal (S_1) of the plurality of monitored signals ($S_1 \dots S_n$) with itself ($r_{11}=1$) and r_{1n} is a cross correlation between the first monitored signal (S_1) of the plurality of monitored signals ($S_1 \dots S_n$) and another monitored signal (S_n) of the plurality of monitored signals ($S_1 \dots S_n$).

8. (Original) The method according to claim 7, further comprising:

identifying one or more pairs of highly correlated monitored signals among the plurality of monitored signals by determining which one or more pairs of monitored signals have a cross correlation that exceeds a predetermined threshold.

9. (Currently Amended) ~~[[The]] A method according to claim 6, further for detecting an artifact~~ comprising:

receiving one or more samples ($s_1 \dots s_n$) of a plurality of monitored signals ($S_1 \dots S_n$) carried on leads from a patient:

calculating, for each (s_m) of the one or more samples ($s_1 \dots s_n$) of the plurality of monitored signals ($S_1 \dots S_n$), a cross probability (p_{mk}) of observing the sample (s_m) and another sample (s_k) assuming a null hypothesis is true, wherein the null hypothesis (H_0) is that the sample (s_m) and the other sample (s_k) have a same distribution as a stored version of the sample (s_m) of the plurality of monitored signals;

weighting each of the calculated cross probabilities so that samples being closer to a norm have a larger weight;

calculating a confidence (c_{mk}) level associated with each of the cross probabilities (p_{mk});

repeating the calculating steps for all combinations of pairs of highly correlated monitored signals of the plurality of monitored signals;

summing, for each sample (s_m), all of the cross probabilities (p_{mk}) associated with a pair of correlated signals (S_{mk}) that includes the sample (s_m); and

on a user interface device, outputting a result for each sample (s_m) as a probability of not including an artifact in the sample, wherein if one or more of the probabilities of not including an artifact lies below a predetermined threshold, then indicating on the user interface that one or more samples associated with one or more of the probabilities may include an artifact.

10. (Currently Amended) The method according to claim 9, further comprising determining a range of cross probabilities of the plurality of stored monitored signals for a given clinical condition, wherein the weighting includes:

weighting each of the calculated cross probabilities (p_{mk}) as follows:

$$P_{mk} = \frac{p_{mk} - 0.5(p_{mk \text{ max specific clinical condition}} + p_{mk \text{ min specific clinical condition}})[[2]]}{(p_{mk \text{ max specific clinical condition}} - p_{mk \text{ min specific clinical condition}})} \times c_{mk}$$

wherein:

$p_{mk \text{ max specific clinical condition}}$ represents a maximum probability value from a stored version of a pair of monitored signals, and

$p_{mk \text{ min specific clinical condition}}$ represents a minimum probability value from a stored version of a pair of monitored signals.

11. (Currently Amended) A method for detecting an artifact in ~~one or more samples ($S_1 \dots S_n$) of comprising:~~

receiving a plurality of monitored signals ($S_1 \dots S_n$) comprising: from one or more leads;

extracting one or more samples ($s_1 \dots s_n$) of the plurality of monitored signals;

calculating, for each (s_m) of the one or more samples ($s_1 \dots s_n$) of the plurality of monitored signals ($S_1 \dots S_n$), a cross probability (p_{mk}) of observing each sample (s_m) and another sample (s_k) assuming a null hypothesis is true, wherein the null hypothesis is that a combined distribution of the sample (s_m) and the other sample (s_k) have a predetermined distribution;

calculating a confidence (c_{mk})_level associated with each of the cross probabilities (p_{mk});

repeating the calculating steps for combinations of pairs of highly correlated monitored signals of the plurality of monitored signals;

summing, for each sample (s_m), a plurality of cross probabilities (p_{mk}) associated with a plurality of pairs of highly correlated signals (S_{mk}), each of which includes a sample (s_m);

outputting for each sample a result, wherein the result is obtained by subtracting the sum from one for each sample (s_m), as a probability of including an artifact in each sample; and

indicating on a display device, generating a display which indicates to an operator of the monitoring system, if one or more of the probabilities of including an artifact exceeds a predetermined threshold, ~~that—then~~ one or more samples associated with the one or more probabilities above the predetermined threshold may include an artifact.

12. (Currently Amended) The method according to claim 11, further comprising:

continuously performing the calculating, summing and subtracting on a periodic basis as long as signals are being received from a patient.

13. (Currently Amended) An apparatus for monitoring a patient comprising:

a plurality of leads, ~~each to—~~which receive a sample of a plurality of monitored signals—signals;

a memory to store each of the received samples of the monitored signals; and

a processor coupled to the memory, said processor being programmed to:

employ hypothesis testing against each of a plurality of monitored signals to determine whether an artifact is present in the plurality of monitored signals, in which a null hypothesis includes an assumption that pairs of samples of ~~highly~~-correlated monitored signals of the plurality of monitored signals have a predetermined distribution; and

determine that an artifact may exist in one of the plurality of monitored signals when a likelihood that the null hypothesis is true falls below a predetermined confidence level.

14. (Original) The apparatus according to claim 13, wherein the processor is further programmed to:

generate a probability that each of the monitored signals includes an artifact.

15. (Original) The apparatus according to claim 14, wherein the processor is further programmed to:

generate an output signal to alert an operator that at least one of the monitored signals includes an artifact when the generated probability exceeds a predetermined threshold.

16. (Currently Amended) An apparatus for detecting an artifact in one or more samples ($s_1 \dots s_n$), of a plurality of monitored signals ($S_1 \dots S_n$), comprising:

one or more leads coupled to receive one of the one or more samples ($s_1 \dots s_n$) of the plurality of monitored signals ($S_1 \dots S_n$);

a memory to store each of the received one or more samples of the plurality of monitored signals; and

a processor coupled to the memory and to the one or more leads
[[45]] and being programmed for:

calculating, for each (s_m) of the one or more samples
($s_1 \dots s_n$) of the plurality of monitored signals ($S_1 \dots S_n$) a cross
probability (p_{mk}) of observing each sample (s_m) and another sample
(s_k) assuming a null hypothesis is true, wherein the null hypothesis
(H_0) is that the sample (s_m) and the other sample (s_k) have the same
distribution as a stored version of the sample (s_m) of the plurality of
monitored signals;

calculating a confidence level (c_{mk})_level associated
with each of the cross probabilities (p_{mk});

repeating the calculating steps for all combinations of
pairs of ~~highly~~-correlated monitored signals of the plurality of
monitored signals;

summing, for each sample (s_m), all of the cross
probabilities (p_{mk}) associated with a pair of highly correlated signals
(S_{mk}) that includes each sample (s_m); and

outputting a result for each sample (s_m) as a probability
of not including an artifact in the sample, wherein if one or more of the
probabilities of not including an artifact lies below a predetermined
threshold indicating to a user that one or more samples associated with
one or more of the probabilities may include an artifact.

17. (Original). The apparatus according to claim 16, wherein the
processor is further programmed for:

calculating a correlation matrix for the plurality of monitored signals
($S_1 \dots S_n$) from a database of a plurality of stored monitored signals as follows:

$$\begin{bmatrix} r_{11} & \cdots & r_{1n} \\ \vdots & & \vdots \\ r_{n1} & \cdots & r_{nn} \end{bmatrix}$$

wherein r_{11} is an autocorrelation of a first monitored signal (S_1) of the
plurality of monitored signals ($S_1 \dots S_n$) with itself ($r_{11}=1$) and r_{1n} is a cross

correlation between the first monitored signal (S_1) of the plurality of monitored signals ($S_1 \dots S_n$) and another monitored signal (S_n) of the plurality of monitored signals ($S_1 \dots S_n$).

18. (Original) The apparatus according to claim 17, wherein the processor is further programmed for:

identifying one or more pairs of highly correlated monitored signals among the plurality of monitored signals by determining which one or more pairs of monitored signals have a cross correlation that exceeds a predetermined threshold.

19. (Currently Amended) The apparatus according to claim 16, wherein the processor is further programmed for:

weighting each of the calculated cross probabilities so that samples being closer to a norm have a larger weight, and the weighting includes:

weighting each of the calculated cross probabilities (pmk) as follows:

$$P_{mk} = \frac{p_{mk} - 0.5(p_{mk \max \text{ specific clinical condition}} + p_{mk \min \text{ specific clinical condition}})[[2]]}{(p_{mk \max \text{ specific clinical condition}} - p_{mk \min \text{ specific clinical condition}})} \times c_{mk}$$

wherein:

$p_{mk \max \text{ specific clinical condition}}$ represents a maximum probability value from a stored version of a pair of monitored signals, and

$p_{mk \min \text{ specific clinical condition}}$ represents a minimum probability value from a stored version of a pair of monitored signals.

20. (Currently Amended) A computer readable media having encoded thereon a plurality of instructions for causing a processor to:

employ hypothesis testing against each of a plurality of monitored signals to determine whether an artifact is present in the plurality of monitored signals, in which a null hypothesis includes an assumption that pairs of samples of ~~highly correlated monitored signals of the plurality of monitored signals have a~~ predetermined common distribution as corresponding pairs of historical versions of the monitored signals; and

determine that an artifact may exist in one of the plurality of monitored signals when a likelihood that the null hypothesis is true falls below a predetermined confidence level.

21. (New) The apparatus according to claim 13, wherein the predetermined distribution includes the same distribution as corresponding pairs of stored versions of the plurality of monitored signals.

22. (New) The apparatus according to claim 13, further including:

a database which stores at least one of historical versions of the monitored signals and parameters of the historical versions of the monitored signals;
and

wherein the predetermined distribution includes a distribution of one of corresponding pairs of samples of historical versions of the monitored signals and the parameters of the historical versions of the monitored signals.